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$r=.405464$ miles per hour, $a=6.532$ miles per hour, $d=47.0148$ miles per hour, $AB=13.4857$ miles, $AC=28.29$ miles, and $AD=76.17$ miles.

Similarly solved by *Professor G. B. M. ZERR*, and solved under a different interpretation by *P. S. BERG, J. F. W. SCHEFFER*, and *J. W. WATSON*.

17. Proposed by G. B. M. ZERR, A. M., Principal of High School, Staunton, Virginia.

A sum of P dollars is loaned at r per cent. interest. At the end of the first year a payment of x dollars is made; and at the end of each following year the payment is made greater by m per cent. than the preceding year. If the sum is paid in n payments, find x.

Solution by ALFRED HUME, C. E., D. Sc., Professor of Mathematics, University of Mississippi, University P. O., Mississippi.

Let $R=1+r$, $M=1+m$.

Amt. owed after 1st. payment $=PR-x$.
.. .. .. 2nd. .. $=(PR-x)\mathrm{R}-xM=PR^2-xR-xM$.
.. .. .. 3rd. .. $=PR^3-xR^2-xMR-xM^2$.
.. .. .. 4th. .. $=PR^4-xR^3-xMR^2-xM^2R-xM^3$.

....

.. .. .. nth. .. $=PR^n-x(R^{n-1}+MR^{n-2}+M^2R^{n-3}+\dots M^{n-2}R+M^{n-1})$.

If n payments cancel the debt, this $=0$. The quantity in the parenthesis is a geometrical progression, the first term being R^{n-1}, the ratio $\frac{M}{R}$, the number of terms n.

$$\text{The sum is } \frac{R^{n-1}\left[\left(\frac{M}{R}\right)^n-1\right]}{\frac{M}{R}-1}=\frac{M^n-R^n}{M-R}.$$

$$\therefore \frac{M^n-R^n}{M-R}x=PR^n,$$

$$\text{and } x=\frac{M-R}{M^n-R^n}PR^n=\frac{(m-r)(1+r)^n}{(1+m)^n-(1+r)^n}P.$$

Also solved by *Professors SCHEFFER, WHITAKER*, and *ZERR*.

18. Proposed by WILLIAM E. HEAL, Member of the London Mathematical Society, Marion, Indiana.

Two railroad trains, lengths m and n, meet at a siding, length l. How shall the trains pass if $l<m<n$?

Solution by W. H. CRALLE, Department of Mathematics, Hogsett Academy, Danville, Kentucky.

Divide train m into sections l or less in length, and with its engine pull its first section on siding; then let engine of n take its train beyond the switch, attach to next section of m and back it till rear of n clears the switch; then let engine of m pull its first section above the switch; then let n back on to switch and beyond, leaving second section of m on switch; next, let engine of n pull its train again beyond switch; then engine of m backs first section into switch and pulls off the second section. This operation is repeated $\frac{m}{l}$ times when all the sections of m will have been passed up, and the trains may proceed.

Variously solved by *P. S. BERG, C. W. M. BLACK, H. W. DROUGHON, H. C. WHITAKER*, and *G. B. M. ZERR.*

PROBLEMS.

23. Proposed by ROBERT J. ALEY, A. M., Professor of Mathematics in Indiania University, Bloomington, Indiana.

Sum to n terms the following series: $11+25+45+71+103+\ldots$.

24. Proposed by ARTEMAS MARTIN, LL. D., U. S. Coast and Geodetic Survey Office, Washington, D. C.

Find x and y from the equations,

$$x^2+2xy^2-2xy=4y^3,$$
$$y^4+2x^3y^2-2xy^2=4x^4.$$

25. Proposed by P. C. CULLEN, Meade, Nebraska.

A man and a boy get n dollars for digging potatoes, the man can dig them as fast as the boy can pull the vines, but the man can pull vines m times as fast as the boy can dig them. Divide the money.

Solutions to these problems should be received on or before August 1st.

GEOMETRY.

Conducted by B.F.FINKEL,Kidder, Missouri. All Contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

11. Proposed by MISS LEOTA MILLER, B. L., Professor of Natural Science and Art, Kidder Institute, Kidder, Missouri.

A gentleman's residence is at the centre of his circular farm containing $a=900$ acres. He gives to each of his $m=7$ children an equal circular farm as large as can be made within the original farm; and he retains as large a circular farm of which his residence is the centre, as can be made after the distribution. Required the area of the farms made.

Solution by Professor P. H. PHILBRICK, C. E., Lake Charles, Louisiana; and Professor G. B. M. ZERR, A. M., Principal of High School, Staunton, Virginia.

Let A be the centre of the farm, B, C, the centres of two of the m farms for the children. Let $BG=GC=x$.

Then $AB=r-x$ where r is the radius of the whole farm. $AF=r-2x$.

Then $BG:AB=\sin BAG:1$,

$$\therefore\ x=(r-x)\sin\frac{\pi}{m}.\ \ \therefore\ x=\frac{r\sin\dfrac{\pi}{m}}{1+\sin\dfrac{\pi}{m}}.$$